



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

| APPLICATION NO.           | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO.   |
|---------------------------|-------------|----------------------|---------------------|--------------------|
| 10/829,212                | 04/22/2004  | Takashi Iwamoto      | 403049              | 5541               |
| 23548                     | 7590        | 10/31/2005           |                     | EXAMINER           |
| LEYDIG VOIT & MAYER, LTD  |             |                      |                     | CHAPMAN JR, JOHN E |
| 700 THIRTEENTH ST. NW     |             |                      |                     |                    |
| SUITE 300                 |             |                      | ART UNIT            | PAPER NUMBER       |
| WASHINGTON, DC 20005-3960 |             |                      |                     | 2856               |

DATE MAILED: 10/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                                    |                         |  |
|------------------------------|------------------------------------|-------------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b>             | <b>Applicant(s)</b>     |  |
|                              | 10/829,212                         | IWAMOTO ET AL.          |  |
|                              | <b>Examiner</b><br>John E. Chapman | <b>Art Unit</b><br>2856 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on \_\_\_\_\_.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-12 is/are pending in the application.
  - 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-12 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) All    b) Some \* c) None of:
    1. Certified copies of the priority documents have been received.
    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>4/22/04</u> . | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. 35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms used in the specification are:

The sentence on page 2, lines 5-8, is unclear.

The sentence beginning on page 3, last line, is unclear.

The sentence on page 4, lines 6-12, is unclear.

Page 9, line 9, "short term" should be --fast--.

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

It is not clear how to set time intervals and sample current values of the ion currents in the respective time intervals in order to determine the time-frequency components thereof.

According to the specification on page 8, lines 18-22, "the time-frequency transforming means 3

Art Unit: 2856

determines the time-frequency components  $C_n(f)$  in the time intervals from the ion current sampled values included in the time intervals  $I_n = (T_n, T_n + \Delta T, \dots, T_n + (M-1)\Delta T)$  that are set allowing overlap determined by the detection control means 5." However, it is not clear what "n" is, what "In" is, what "Tn" is, what " $\Delta T$ " is, what "M" is, and what the time intervals are. Note that  $(T_n, T_n + \Delta T, \dots, T_n + (M-1)\Delta T)$  is a series and not an interval. What the series has to do with time intervals is not clear. Assuming that "In" is the n-th time interval and "M" is the total number of intervals, i.e. 5 in Fig. 3, then the zeroth interval  $I_0$  would be  $I_0 = (T_0, T_0 + \Delta T, \dots, T_0 + 4\Delta T)$ . But it appears from Fig. 3 that  $I_0 = (T_0, T_0 + \Delta T)$ , where "T<sub>0</sub>" is the initial time and " $\Delta T$ " is the length of "Interval 0" in Fig. 3. What significance the other terms in the  $I_0$  series have is unclear. Similarly, the first interval  $I_1$  would be  $I_1 = (T_1, T_1 + \Delta T, \dots, T_1 + 4\Delta T)$ . But it appears from Fig. 3 that  $I_1 = (T_0 + \frac{1}{2}\Delta T, T_0 + \frac{3}{2}\Delta T)$ . How these  $I_1$  equations are consistent is far from evident.

Applicant goes on to state on page 9, lines 4-6, "In the present embodiment, an example is described where  $M = 256$  and  $T_{n+1} = T_n + (M/K)\Delta T$  (where  $K = 8$  and  $n = 0, 1, 2, \dots$ ). However, applicant fails to identify what "M" signifies, what "K" signifies, and what "n" signifies. Furthermore, it would appear that by definition  $\Delta T = T_{n+1} - T_n$ . Hence, the equation on page 9, line 5, appears to be inconsistent with the common definition of " $\Delta T$ ".

On page 9, lines 9-10, it is not clear what is meant by "a Hanning window  $W(m)$  of an order M." It is not clear whether the "order M" of the Hanning window is the same as the "M" in the time intervals "In" on page 8, line 21, and page 9, line 5.

On page 9, equation 2, it is not clear what "Tn" is, what " $\Delta T$ " is, and what "M" is. Furthermore, it is noted that "x" increases by " $\Delta T$ " in the sequence in equation 2, whereas it

increases by “ $\Delta t$ ” in the sampled values on page 8, line 13. It is not clear whether “ $\Delta T$ ” is the same as, or different from, “ $\Delta t$ ”.

On page 10, line 9-10, it is not clear what it means for “the logical expression  $f(x)$ ” to “become the true value.”

On page 12, line 1, it is not clear why the “standard factor C” is not a function of “n”, since “ $C_n(f)$ ” is a function of both “n” and “f”. While dependency upon “f” is eliminated by summation over “f”, it is not clear how the dependency upon “n” is eliminated. It would appear that “C” should be -- $C_n$ -- on the left hand side of equation 4.

On page 12, it is not clear what is meant by “the above-described resolution principle” in line 14. What “resolution principle”?

On page 13, it is not clear how the window function of equation 6 is used to obtain “a Gabor wavelet component.” It is not clear what is meant by “a Gabor wavelet component.” Applicant neither defines the term nor incorporates by reference an article that defines the term. In addition, the specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to determine what other window functions could be used to obtain a “wavelet transform,” as recited in claims 3 and 9. Accordingly, the invention is not commensurate in scope with the claims.

In addition, it is not clear what “L” is in equation 6. While the applicant gives one example for L on page 13, line 19, applicant never defines “L” in general.

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 2, 4, 7, 8, 10 and 11, as best understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Frankowski et al.

Frankowski et al. disclose a knock detection method and apparatus comprising a flame ionization sensor (column 4, line 57), a time-frequency transforming means 109 (column 6, line 20), a knock detecting means (column 4, lines 44-47), and a means for inputting a running status (engine angular displacement). The time-frequency transforming means 109 sets time intervals 205 and 215 in Fig. 2 having overlapping data sets (column 11, lines 41-47).

Regarding claims 5 and 11, the means for inputting a running status (engine angular position) changes the sampled times dependent on engine speed, since the time interval of the crank angle window 205 will change with engine speed.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 6 and 12, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Frankowski et al.

The only difference between the claimed invention and the prior art appears to consist in dividing a knock determination equation by a “standard factor.” Frankowski et al. disclose a knock determination equation comprising the sum of Bessel function coefficients and compare the sum with a scaled, time-weighted version 909 in Fig. 9. It would have been an obvious mathematical equivalent to divide the sum of Bessel function coefficients by a time-weighted version and compare the ratio with a predetermined threshold (i.e., the scale factor). A time-weighted version 909 comprises a “standard factor” in that it is used for standardization.

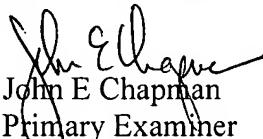
Alternatively, a non-knock variable (column 10, line 43) comprises a “standard factor.”

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ichihara et al. discloses a method and apparatus for detecting knock in an internal combustion engine comprising overlapping ranges of crank angles in which a signal is picked up. See Fig. 1(a) and Fig. 2(b).

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John E. Chapman whose telephone number is (571) 272-2191. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on (571) 272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2856

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
John E Chapman  
Primary Examiner  
Art Unit 2856